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10/531,763

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Susan D. Strothers

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BUCHALTER NEMER
18400 VON KARMAN AVE.
SUITE 800
IRVINE, CA 92612

EXAMINER

BERMAN, JASON

ART UNIT

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MAIL DATE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/531,763	Applicant(s) STROTHERS ET AL.	
	Examiner Jason M. Berman	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/18/2005, 10/16/2007, 4/15/2008, 6/10/2008,</u> | 6) <input type="checkbox"/> Other: ____. |
| <u>7/17/2008, 10/14/2008.</u> | |

DETAILED ACTION

Status of the Claims

Claims 1-45 are pending in the current application.

Claim Objections

1. Claims 4, 15, 27 and 38 objected to because of the following informalities:

Aluminum is not a transition metal. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 5, 7-10, 12-14, 17-20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Enomoto (Machine Translation of JP 2000-073164 A).

As to claim 1, Enomoto discloses a sputtering target comprising:

- A target surface component comprising a target material (Figure 1: showing target 'T');
- A core backing component having a coupling surface and a back surface, wherein the coupling surface is coupled to the target surface component (Figure 1: backing plate 1 of target 'T'); and
- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature

increases the effective surface area of the core backing component
(Figure 1: bulge 5 in backing plate).

As to claims 2-3, Enomoto discloses the target comprises a transition metal
(paragraph 2: ITO target).

As to claim 5, Enomoto discloses the surface area feature comprises a concave
feature, a convex feature, or a combination thereof (Figure 1: convex bulge 5 creating
concave areas between bulges).

As to claim 7, Enomoto discloses the concave feature comprises a dimple
(Figure 1: indentations between bulges).

As to claim 8, Enomoto discloses the concave feature comprises a plurality of
linear channels (Figure 1: elongated indentations between bulges).

As to claim 9, Enomoto discloses the convex feature comprises a plurality of
linear ridges (Figure 1: bulges 5 as linear pipes).

As to claim 10, Enomoto discloses the convex feature comprises a bump (Figure
1:bulges 5).

As to claim 12, Enomoto discloses a sputtering target comprising:

- A target surface component comprising a target material (Figure 1:
showing target 'T');
- A core backing component having a coupling surface and a back surface,
wherein the coupling surface is coupled to the target surface component
(Figure 1: backing plate 1 of target 'T'); and

- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature comprises an additive feature (Figure 1: bulge 5 in backing plate).

As to claims 13-14, Enomoto discloses the target comprises a transition metal (paragraph 2: ITO target).

As to claim 17, Enomoto discloses the subtractive feature comprises a dimple (Figure 1: convex bulge 5 creating concave areas between bulges).

As to claim 18, Enomoto discloses the subtractive feature comprises a plurality of linear channels (Figure 1: elongated indentations between bulges).

As to claim 19, Enomoto discloses the additive feature comprises a plurality of linear ridges (Figure 1: bulges 5 as linear pipes).

As to claim 20, Enomoto discloses the additive feature comprises a bump (Figure 1: bulges 5).

As to claim 22, Enomoto discloses a method of forming a sputtering target comprising:

- Providing a target surface component comprising a surface material (Figure 1: target 'T');
- Providing a core backing component comprising a backing material and having a coupling surface and a back surface (Figure 1: backing plate 1);
- Providing at least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component,

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wherein the surface area feature increases the effective surface area of the core backing component (Figure 1: bulge 5 in backing plate); and

- Coupling the surface target component to the coupling surface of the core backing component (paragraph 13: attach target to backing plate).

3. Claims 1-5, 7-10, 12-15, 17-20, 22-28, 30-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Demaray (US 5,433,835).

As to claim 1, Demaray discloses a sputtering target comprising:

- A target surface component comprising a target material (figure 10c: target 86);
- A core backing component having a coupling surface and a back surface, wherein the coupling surface is coupled to the target surface component (Figure 10C: target 86 attached to backing plate 87); and
- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component (Figure 10C: grooves 108 on back side of backing plate 87).

As to claims 2-4, Demaray discloses the target comprises a transition metal such as Ti (abstract: titanium to titanium bonding of target to backing).

As to claim 5, Demaray discloses the surface area feature comprises a concave feature, a convex feature, or a combination thereof (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 7, Demaray discloses the concave feature comprises a dimple (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 8, Demaray discloses the concave feature comprises a plurality of linear channels (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 9, Demaray discloses the convex feature comprises a plurality of linear ridges (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 10, Demaray discloses the convex feature comprises a bump (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 12, Demaray discloses a sputtering target comprising:

- A target surface component comprising a target material (figure 10c: target 86);
- A core backing component having a coupling surface and a back surface, wherein the coupling surface is coupled to the target surface component (Figure 10C: target 86 attached to backing plate 87); and
- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature comprises a subtractive feature (Figure 10C: grooves 108 on back side of backing plate 87).

As to claims 13-15, Demaray discloses the target comprises a transition metal such as Ti (abstract: titanium to titanium bonding of target to backing).

As to claim 17, Demaray discloses the subtractive feature comprises a dimple (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 18, Demaray discloses the subtractive feature comprises a plurality of linear channels (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 19, Demaray discloses the additive feature comprises a plurality of linear ridges (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 20, Demaray discloses the additive feature comprises a bump (Figure 10C: showing back of backing plate 87 as alternating grooves and ridges).

As to claim 22, Demaray discloses a method of forming a sputtering target comprising:

- Providing a target surface component comprising a surface material (figure 10c: target 86);
- Providing a core backing component comprising a backing material and having a coupling surface and a back surface (figure 10c: showing backing plate 85);
- Providing at least on surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component, wherein the surface area feature increases the effective surface area of

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the core backing component (figure 10c: showing grooves 108 in back side of backing plate 87); and

- Coupling the surface target component to the coupling surface of the core backing component (Figure 10C: target 86 attached to backing plate 87).

As to claim 23, Demaray discloses a method of forming a sputtering target comprising:

- Providing a target surface component comprising a surface material (figure 10b: target 86);
- Providing a core backing component comprising a backing material and having a coupling surface and a back surface (figure 10b: backing plate 85);
- Providing at least on surface area feature coupled to or located in the coupling surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component (figure 10b: groove 108 on coupling side of backing plate 85); and
- Coupling the surface target component to the coupling surface of the core backing component (figure 10b: target 86 shown attached to backing plate 85).

As to claim 24, Demaray discloses a sputtering target comprising:

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- An integrated target surface component and core backing component, wherein the surface component and the backing component comprise the same target material (abstract: monolithic target and backing or titanium to titanium bonding of target to backing plate; figure 10C: target 86 and backing plate 87); and
- At least one surface area feature that is on or integrated into the core backing component, wherein the surface area feature increases the effective component of the core backing component (Figure 10C: grooves 108 in backing plate 87).

As to claims 25-27, Demaray discloses the target comprises a transition metal such as Ti (abstract: titanium to titanium target and backing).

As to claim 28, Demaray discloses the surface area feature comprises a concave feature, a convex feature, or a combination thereof (Figure 10C: alternating grooves 108 and ridges [unlabeled] in backing plate 87).

As to claim 30, Demaray discloses the concave feature comprises a dimple (Figure 10C: alternating grooves 108).

As to claim 31, Demaray discloses the concave feature comprises a plurality of linear channels (Figure 10C: alternating grooves 108).

As to claim 32, Demaray discloses the convex feature comprises a plurality of linear ridges (Figure 10C: alternating grooves 108 and unlabeled ridges).

As to claim 33, Demaray discloses the convex feature comprises a bump (Figure 10C: alternating grooves 108 and unlabeled ridges).

4. Claims 1-3, 5-7, 11-14, 16, 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagashima (US 4,569,745).

As to claim 1, Nagashima discloses a sputtering target comprising:

- A target surface component comprising a target material (Figure 5A: target 12);
- A core backing component having a coupling surface and a back surface, wherein the coupling surface is coupled to the target surface component (Figure 5A: backing plate 11); and
- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component (Figure 5A: conduit 15 on bottom of plate 11).

As to claims 2-3, Nagashima discloses the target comprises a transition metal (col 3 line 25: chromium target).

As to claim 5, Nagashima discloses the surface area feature comprises a concave feature, a convex feature, or a combination thereof (Figures 5A and 5B: conduit 15 with ridges between conduit in backing plate 11).

As to claim 6, Nagashima discloses the concave feature comprises at least one concentric indentation (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

As to claim 11, Nagashima discloses the convex feature comprises at least one concentric ridge (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

As to claim 12, Nagashima discloses a sputtering target comprising:

- A target surface component comprising a target material (Figure 5A: target 12);
- A core backing component having a coupling surface and a back surface, wherein the coupling surface is coupled to the target surface component (Figure 5A: backing plate 11); and
- At least one surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature comprises a subtractive or additive feature (Figure 5A: conduit 15 on bottom of plate 11).

As to claims 13-14, Nagashima discloses the target comprises a transition metal (col 3 line 25: chromium target)

As to claim 16, Nagashima discloses the subtractive feature comprises at least one concentric indentation (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

As to claim 21, Nagashima discloses the additive feature comprises at least one concentric ridge (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

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As to claim 22, Nagashima discloses a method of forming a sputtering target comprising:

- Providing a target surface component comprising a surface material (Figure 5A: target 12);
- Providing a core backing component comprising a backing material and having a coupling surface and a back surface (Figure 5A: backing plate 11);
- Providing at least on surface area feature coupled to or located in the back surface of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component, wherein the surface area feature increases the effective surface area of the core backing component (Figure 5A: conduit 15 on bottom of plate 11); and
- Coupling the surface target component to the coupling surface of the core backing component (Figure 5A: showing target 12 attached to backing plate 11).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 29 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Demaray as applied to claim 28 above, and further in view of Nagashima.

As to claims 29 and 34, Demaray discloses the use of a cooling conduit on the back of a backing plate (as discussed above), but is silent as to a concentric configuration.

Nagashima discloses a target and backing plate assembly with a cooling conduit in the back of a backing plate (figure 5A: target 12, backing plate 11, and cooling conduit 15). This cooling conduit is concentric in shape (figure 5B) having both a concentric ridge (Figure 5A: ridge between cooling conduit) and a concentric indentation (Figure 5A: convex indentation of conduit 15) and is disclosed as having a higher cooling effect than other orientations (col 3 lines 61-65).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a concentric cooling conduit, as disclosed by Nagashima, in the sputtering apparatus of Demaray, because the cooling arrangement provides effective cooling.

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8. Claims 35-37, 39-40 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagashima in view of Mishima (US 5,338,425).

As to claim 35, Nagashima discloses a sputtering target comprising:

- An integrated target surface component and core backing component comprising a target material (Figure 5A: bonded target 12 and backing plate 11);
- At least one surface area feature that is located on or integrated into the core backing component which increases the effective surface area of the core backing component (Figure 5A: conduits 15 in backing plate 11).

Nagashima discloses a backing plate and target assembly (as discussed above), but is silent as to the target comprising a material gradient.

Mishima discloses a target and backing plate apparatus (figure 1: target 11 with backing layer 12). Mishima also discloses the use a gradient in the composition of the target material in order to improve mechanical strength and improve bonding with the backing plate when sputtering silicon (col 3 lines 24-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a material gradient, as disclosed by Mishima in the sputtering apparatus of Nagashima, because the gradient allows for greater strength and bonding when using materials such as silicon.

As to claims 36-37, Nagashima discloses the target comprises a transition metal (col 3 line 25: chromium target).

As to claim 39, Nagashima discloses the surface area feature comprises at least one concave feature and convex feature (Figure 5A: conduit 15 (concave) and ridges (convex) between conduits in backing plate 11).

As to claim 40, Nagashima discloses the subtractive feature comprises at least one concentric indentation (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

As to claim 45, Nagashima discloses the additive feature comprises at least one concentric ridge (Figure 5B: conduit 15 with ridges between conduit in backing plate 11).

9. Claims 35-38, 39 and 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Demaray in view of Mishima (US 5,338,425).

As to claim 35, Demaray discloses a sputtering target comprising:

- An integrated target surface component and core backing component comprising a target material (abstract: target and backing monolith);
- At least one surface area feature that is located on or integrated into the core backing component which increases the effective surface area of the core backing component (Figure 10C: grooves 108 on back side of backing plate 87).

Demaray discloses various materials the target may be composed of various materials (abstract), but is silent as to the target comprising a material gradient.

Mishima discloses a target and backing plate apparatus (figure 1: target 11 with backing layer 12). Mishima also discloses the use a gradient in the composition of the

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target material in order to improve mechanical strength and improve bonding with the backing plate when sputtering silicon (col 3 lines 24-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a material gradient, as disclosed by Mishima in the sputtering apparatus of Demaray, because the gradient allows for greater strength and bonding when using materials such as silicon.

As to claims 36-38, Demaray discloses the target comprises a transition metal such as Ti (abstract: titanium to titanium target and backing).

As to claim 39, Demaray discloses the surface area feature comprises a concave feature, a convex feature, or a combination thereof (Figure 10C: alternating grooves 108 and ridges [unlabeled] in backing plate 87).

As to claim 41, Demaray discloses the concave feature comprises a dimple (Figure 10C: alternating grooves 108).

As to claim 42, Demaray discloses the concave feature comprises a plurality of linear channels (Figure 10C: alternating grooves 108).

As to claim 43, Demaray discloses the convex feature comprises a plurality of linear ridges (Figure 10C: alternating grooves 108 and unlabeled ridges).

As to claim 44, Demaray discloses the convex feature comprises a bump (Figure 10C: alternating grooves 108 and unlabeled ridges).

Correspondence Information

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Berman whose telephone number is (571)270-5265. The examiner can normally be reached on M-R 8am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

/J. M. B./
Examiner, Art Unit 1795